

INHERITANCE OF ANGULAR LEAF SPOT RESISTANCE IN SELECTED COMMON BEAN GENOTYPES

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Introduction

Evidence of co-evolution of *P. griseola* and common bean implies that combining resistance from the Andean and Mesoamerican gene pools is a good strategy for disease control. To effectively combine and pyramid useful diverse genes, sufficient characterization of the genetics of resistance is necessary. Very little is known about the nature and inheritance of ALS resistance in common bean although this information is important to facilitate breeding for ALS resistance, to deploy ALS resistance genes, and for gene tagging and the development of molecular markers for marker assisted selection (MAS). The objective of this study was to elucidate the inheritance of ALS resistance in selected ALS differential genotypes and promising resistant germplasm.

Materials and Methods

Segregating populations (F1, F2, and F1 backcrosses to resistant and susceptible parents) were developed by crossing the snap bean variety, Sprite (susceptible) with 5 ALS differential varieties (Don Timoteo, Amendoim, PAN 72, Mexico 54, Cornell 49242) and two potential sources of resistance (G 10474 and G 10909) (Table 1). Andean genotypes (Don Timoteo, Amendoim) were screened under green house conditions using Andean races while Mesoamerican genotypes (PAN 72, , Mexico 54, Cornell 49242, G 10474 and G 10909) were screened using Mesoamerican races (Table 1). Evaluations for disease severity were assessed using a CIAT 1 – 9 scale, where 1 represents no visible symptoms and 9 = severe symptoms and disease expression. Ratings of 1 to 3 were considered resistant and ratings > 4 as susceptible. Area under disease progress curves was calculated to assign genotypes to resistance and susceptibility classes and the Chi-squared test in the SAS program was used to test different genetic inheritance models.

Results and Discussion

The observed segregation ratios revealed that a single dominant gene conditions ALS resistance in the genotypes, Don Timoteo, PAN 72 and G 10474 (Table 1). Two dominant genes control resistance in Cornell 49242, G 5686 and G 10909, while G 2858 has two duplicate genes, Mexico 54 a single recessive gene, and Montcalm and Amendoim have two recessive genes each (Table 1). However, results with Amendoim were somewhat ambiguous. Sartorato et al, (1999) reported that ALS resistance in Mexico 54 was conditioned by a single dominant gene, *Phg-2*, while Caixeta et al. (2002) reported that Mexico 54 has three ALS resistance genes, designated *Phg-2*, *Phg-5* and *Phg-6*. The ALS races that we used (31-55), as well as the background in which we elucidated the nature of ALS resistance in Mexico 54 (the snap bean variety, Sprite), differs from the ones used by the Brazilian group (races 63-39, 63-23, variety Ruda-Mesoamerican). It is possible that the background in which we are detecting the single resistance gene in Mexico 54 has an influence on the outcome of the tests. Nevertheless,

the results reported show the complex nature of inheritance of resistance to *P. griseola*. Major genes (whether recessive or dominant) are involved in conferring resistance to ALS.

Table 1. Nature and inheritance of angular leaf spot resistance in some differential varieties and selected resistant sources.

Source	PG race	Generation	Observed	Expected	X ²	Interpretation
Cornell 49242	63-31	F1	18:0			2 dominant Genes
		F2	49:22	9:7	0.09	
		BC-P1 (res)	64:9			
		BC-P2 (sus)	13:25	1:3	0.19	
Mex 54	31-55	F1	20:69			1 rec. gene
		F2	39:120	1:3	0.89	
		BC-P1 (res)	32:24	1:1	0.28	
		BC-P2 (sus)	28:86	1:3	0.91	
PAN 72	15-0	F1	137:0			1 dominant gene
		F2	47:15	3:1	0.88	
		BC-P1 (res)				
		BC-P2 (sus)	17:16	1:1	0.86	
G10474	63-63	F1	40:0	1:0		1 dominant gene
		F2	57:25	3:1	0.25	
		BC-P2 (sus)	9:8	1:1	0.80	
G10909	63-63	F1	-			2 dominant genes
		F2	92:73	9:7	0.89	
		BC-P2 (sus)	7:35	1:3	0.21	
Amendoim	15-0	F1	0:136			Recessive
		F2	7:107	1:15	0.96	2 rec. genes
		BC-P1 (res)	5:87	1:15	0.74	3 rec. genes
		BC-P2 (sus)	0:58			
Timoteo	62-0	F1	59:3			1 dominant gene
		F2	47:24	3:1	0.11	
		BC-P1 (res)	28:3			
		BC-P2 (sus)	17:17	1:1	1.0	

Literature cited:

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